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A Knowledge test in physical education.

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A KNOWLEDGE TEST IN PHYSICAL EDUCATION

Submitted by

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CHAPTER I

A KNOWLEDGE TEST IN PHYSICAL EDUCATION

The purpose of the test.-- It is the purpose of this paper (1) to prepare a test of secondary-school pupils' knowledge of the vocabulary of physical education. (2) to give the test to ninety-eight boys in the sophomore and senior classes of Natick High School and to analyze the results thus obtained, and (3) to see if there is any comparison between this test and the athletic ability of the group tested.

The physical education program for which the test was constructed.-- Natick High School is part of a 6-3-3 system, with a total of 200 boys in the sophomore, junior, and senior classes. Each class is required to take one period of physical education a day (five periods a week), each period being forty-five minutes in length. After time is taken out for changing into gym suits and taking showers, the remainder of the period is divided into three major divisions, (a) a warm-up for about five minutes, (b) instruction or participation in some skill for about twelve minutes, and (c) a game for about seven minutes. Under each of the three major headings mentioned above, the following material was covered during

the school year:

A. Warm-up

Calisthenics, football "grass drill," and open road running (fall and spring only).

B. Skills

Fall--Football and soccer.

Winter--Tumbling, wrestling, boxing, marching, apparatus, basketball and volleyball.

Spring--Baseball, softball and track.

C. Games

Fall--Touch-football and soccer.

Winter--Basketball, volleyball, fistball, relay games, circle games and combative games.

Pupils taking the test.-- The knowledge test in physical education was given to two groups of boys, 49 (forty-nine) seniors who had already taken two and one-half years of physical education and 49 (forty-nine) sophomores who had had only one-half year of physical education.

How the test was constructed.-- In constructing this test the writer tried to keep in mind the items that were covered in the physical-education program during the course of the year, as well as the materials used in the teaching of these items, such as apparatus, sports and gymnasium equipment, fields, and areas on which the various games and activities took place. All of the activities that were

covered during the year were listed under the three major headings of Warm-up, Skills, and Games, and from these major divisions the test items were constructed. The following table shows the distribution of test items which were selected from the material covered during the school year:

Materials Covered	Number of Test Items
A. Warm-up Activities	
1. Calisthenics	7
2. Football grass drill	0
3. Open-road running	0
B. Games and Skills Activities	
1. Football	19
2. Soccer	5
3. Tumbling	9
4. Wrestling	8
5. Boxing	8
6. Apparatus	0
7. Marching	15
8. Basketball	10
9. Volleyball	5
10. Baseball and softball	16
11. Track	5
C. Names of gym apparatus	7
D. Names of playing areas	5
E. Names of sports and gym equipment	14
F. General knowledge	20

After summarizing all of the divisions of this test[1] we find the total number of test items to be distributed as follows:

A. Warm-up	7
B. Games and skills	100
C. Gym apparatus	7
D. Playing areas	5
E. Sports and gym equipment	14
F. General knowledge	20
Total	153

Administering the test.-- It was decided to administer this test to forty-nine seniors and forty-nine sophomores taken at random from the senior and sophomore classes respectively. This number represented approximately two-thirds of each class. The test was administered during regular class periods in a classroom made available for this purpose. In all cases the boys completed the test in the time allowed or less. Thirty-four minutes was the longest time any boy took to complete the test.

1/See Appendix for copy of the test used.

CHAPTER II

RESULTS OBTAINED FROM THE ADMINISTRATION OF THE TEST

Measures of central tendency and dispersion.-- The results of the test will be presented in two ways: first, through measures of central tendency and dispersion; second, through an analysis to determine the internal consistency of the test.

Table 1 shows the means, medians, ranges, and standard deviations.[1/]

Table 1. Comparison of achievement of sophomores and seniors of the test--central tendencies and measures of dispersion.

Group	Central tendencies		Dispersion	
	Mean	Median	Range	Standard Deviation
Sophomores..	123.0	125.6	69-142	7.3
Seniors.....	131.6	133.7	98-147	6.0

In Table 1 the senior mean is 8.6 points higher than the sophomore mean. The senior median is 8.1 points higher than the sophomore median. The sophomore range is from 69

1/See Appendix for computations.

to 142 or 73 points, while the senior range is from 98 to 147 or 49 points. The lowest sophomore score of 69 is 29 points lower than the lowest senior score of 98. The highest sophomore score, 142, is 5 points lower than the highest senior score of 147.

The forty-nine seniors have a higher mean and a higher median than the forty-nine sophomores. The highest senior score is higher than the highest sophomore score. Likewise, the lowest senior score is not as low as the lowest sophomore score.

These facts tend to suggest that the seniors, who have had physical education for a longer period of time, have acquired a greater knowledge of physical-education terms than the sophomores.

Table 2 shows the percentages of correct answers made by the sophomores and seniors on the eight tests.

This table of percentages of correct answers made by the sophomores and seniors shows that in each of the eight tests the seniors made a higher percentage of correct answers than the sophomores. This would indicate that the forty-nine seniors were superior to the forty-nine sophomores in whatever the test measures.

Table 2. Percentages of correct answers made by sophomores and seniors on the eight tests.

Tests	Sophomore Percentages	Senior Percentages	Amount of Senior Superiority
I.....	89.8	98.3	8.5
II.....	82.1	91.6	9.5
III.....	65.7	68.2	2.5
IV.....	92.8	96.8	4.0
V.....	81.8	86.8	5.0
VI.....	65.5	76.1	10.6
VII.....	79.4	83.7	4.3
VIII.....	95.5	96.4	.9

Number and percentages of errors made on each test item.-- The X's in the following tables (Table 3 through Table 8) show the errors made by the individual pupils on the various items. It will be noted that the sophomore group is divided into thirds on the basis of total scores made on the test. A similar division is made for the seniors.

Table 3. The upper third of the forty-nine sophomores, showing what items were incorrect on the eight tests.

Names	Total Scores	Test I						Test II													Test III					Test IV							Test V																									Test VI															Test VII																
		1	2	3	5	7	9	13	14	16	18	21	24	26	26	28	30	31	32	34	36	39	40	42	43	46	48	50	51	52	53	55	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	85	86	87	88	89	91	92	93	95	97	98	99	102	103	105	107	108	109	110	111	112	113	114	116	116	117	118	119	120	121	122	123
R.H.	142				X					X		X													X							X				X																																			X														X					
G.T.	140										X											X		X																													X																																X				X
C.H.	140									X														X																						X									X						X		X							X															X				X
C.A.	140											X												X																																					X		X	X	X			X																	X					
A.W.	136														X	X						X		X																																								X	X	X													X						X			X		
C.B.	136								X		X	X			X							X	X	X											X	X		X																								X																									X					
C.S.	135												X					X						X														X												X	X					X									X	X			X			X						X							X	X			X
D.M.	135				X																	X		X											X									X		X			X	X													X	X			X			X													X					
R.K.	134				X																	X		X																X																X																								X				X			X	X				
J.W.	134																	X				X		X																					X										X	X								X	X															X						X			X		
R.G.	134									X		X	X											X																																				X						X	X		X	X		X														X					
T.L.	132									X		X			X		X					X		X			X	X																																				X		X	X						X															X				X
A.C.	131				X								X				X					X																													X				X	X			X	X		X			X																				X	X				
R.C.	131				X					X			X									X		X																											X		X			X		X	X	X					X		X			X		X													X					
L.S.	130										X			X								X		X								X	X												X		X			X			X	X		X												X			X														X					
C.C.	130												X		X			X				X		X				X					X			X					X																																						X			X			X	X		X		
Number wrong		0	0	0	5	0	0	0	1	5	3	5	5	1	4	1	2	3	0	0	0	11	1	14	1	0	1	2	0	0	0	2	2	0	2	3	0	2	0	1	1	0	0	0	3	1	2	0	0	3	4	0	3	1	3	6	0	1	3	2	3	2	2	6	9	2	1	5	1	3	5	1	0	0	0	0	2	3	0	0	2	0	0	16	4	0	3	0	4
Percentage wrong		0	0	0	31	0	0	0	6	31	18	31	31	6	25	6	12	18	0	0	0	68	6	87	6	0	6	12	0	0	0	12	12	0	12	18	0	12	0	6	6	0	0	0	18	6	12	0	0	18	25	0	18	6	18	37	0	6	18	12	18	12	12	37	56	12	6	31	6	18	31	6	0	0	0	0	12	18	0	0	12	0	0	100	26	0	18	0	25

Test VII

103	105	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145
													X																											
													X					X							X				X		X						X				
													X					X												X											
													X																	X											
							X						X			X				X				X						X											
													X											X							X										
X						X							X	X				X		X				X				X		X											
X													X											X																	
						X				X			X	X						X				X				X		X			X				X				
							X						X			X														X	X				X	X					
X													X											X						X											
X													X					X		X				X						X											
													X	X																X	X		X	X							
	X												X											X							X										
X							X			X			X	X		X														X											
5	1	0	0	0	0	2	3	0	0	2	0	0	16	4	0	3	0	4	0	4	0	0	0	10	0	0	0	3	1	12	4	0	2	1	1	3	1	0	0	0
1	6	0	0	0	0	12	18	0	0	12	0	0	100	25	0	18	0	25	0	25	0	0	0	62	0	0	0	18	6	75	25	0	12	6	6	18	6	0	0	0

146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166
		X																		
X		X																		
		X																		
		X																		
		X																		
		X																		
X		X			X										X					
X	X	X			X															
X		X													X					
	X	X																		
		X																		
	X	X																		
		X																		
		X										X								
		X										X								
		X			X							X								
5	2	15	1	0	3	0	0	0	0	0	0	3	0	0	2	0	0	0	0	0
5	12	93	6	0	18	0	0	0	0	0	0	18	0	0	12	0	0	0	0	0

Test VIII

168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187
										X				X					
										X		X	X					X	
													X						
	X																		
	X	X												X					
			X																
0	2	1	1	0	0	0	0	0	0	2	0	1	2	2	0	0	0	1	0
0	12	6	6	0	0	0	0	0	0	12	0	6	12	12	0	0	0	6	0

Test VII

102	103	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
											X			X				X									X									X	X		
	X							X						X					X						X					X	X							X	X	
	X								X					X	X	X									X						X									
							X				X			X	X										X				X		X							X		
								X						X	X		X				X			X	X		X			X	X					X				
														X	X						X							X	X			X				X	X			
								X													X								X		X									
	X										X			X							X				X									X			X	X		
							X	X			X			X							X			X	X				X		X	X				X				
							X							X											X						X									
												X	X	X			X				X				X					X	X									
								X						X											X															
	X	X						X						X			X				X				X					X	X	X	X	X			X	X		
							X	X			X			X	X		X				X				X						X			X						
							X							X	X		X		X		X				X				X	X	X									
	X							X						X			X				X			X	X					X	X									
	X						X				X			X	X		X				X				X		X		X	X	X		X		X	X	X			
							X	X						X	X				X		X		X		X						X									

144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166
		X	X	X									X				X			X		
		X		X													X					
				X																		
		X		X										X								
		X		X			X						X				X					
		X										X	X									X
			X	X			X						X				X					
				X												X						
				X										X								
		X		X							X											
		X		X																		
				X				X														
		X		X																		
		X		X			X															
		X		X								X					X					
		X		X													X					
		X		X									X									
		X		X										X		X						
		X		X			X															
		X		X								X					X					

Test VIII

168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187
																X			
																		X	
	X																		X
									X										
				X															
	X	X											X						X
								X											
									X										
	X																		

5	1	0	0	0	0	7	7	1	0	6	1	1	16	8	1	6	1	3	0	11	0	1	3	14	0	4	2	7	5	12	7	1	4	0	6	10	5	0	0
29	5	0	0	0	0	41	41	5	0	35	5	5	94	47	5	35	5	17	0	64	0	5	17	82	0	23	11	41	29	70	41	5	23	0	35	58	29	0	0

0	0	12	2	16	0	0	5	1	0	0	1	5	3	4	0	2	6	0	1	1	0	1	0	3	1	0	1	0	0	0	1	3	0	0	0	2	0	0	1	0	2	0
0	0	70	11	88	0	0	29	5	0	0	5	29	17	23	0	11	35	0	5	5	0	5	0	17	5	0	5	0	0	0	5	17	0	0	0	11	0	0	5	0	11	0

Table 4. The middle third of the forty-nine sophomores, showing what items were incorrect on the eight tests.

Names	Total scores	Test I						Test II													Test III				
		1	2	3	5	7	9	13	14	16	18	21	24	25	26	28	30	31	32	34	36	39	40	42	43
G.B.	130									X												X		X	
D.H.	130				X													X							
R.F.	129					X						X			X							X		X	
J.F.	129									X			X									X		X	
J.M.	128									X		X						X				X			
R.R.	127									X		X	X			X						X			X
T.F.	127																							X	
T.C.	126					X						X				X						X		X	
W.C.	126				X					X	X	X	X		X							X		X	
L.H.	125																							X	
M.N.	124									X			X			X						X			
N.J.	124									X		X							X			X		X	X
H.C.	123									X			X									X		X	
R.B.	120				X																	X		X	
K.V.	119									X	X	X				X		X				X		X	
C.S.	119									X	X											X		X	
P.P.	119				X					X			X		X		X					X		X	
Number wrong		0	0	0	4	2	0	0	0	11	3	7	6	0	3	4	1	3	1	0	0	14	0	13	2
Percentage wrong		0	0	0	23	11	0	0	0	64	17	41	35	0	17	23	5	17	5	0	0	82	0	76	11

Names	Test IV							Test V																								
	46	48	50	51	52	53	55	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83
G.B.											X					X								X				X	X			
D.H.			X				X															X				X				X		
R.F.																																
J.F.																									X	X					X	
J.M.						X																			X						X	
R.R.										X															X			X				
T.F.										X							X			X		X			X	X			X	X	X	X
T.C.			X							X															X	X		X			X	X
W.C.			X																												X	
L.H.							X																									
M.N.			X								X		X			X										X					X	
N.J.			X							X			X	X		X			X	X			X	X			X	X				X
H.C.	X									X																X			X	X	X	
R.B.										X	X									X	X				X			X	X	X		
K.V.										X													X			X				X	X	
C.S.																					X				X	X		X	X	X	X	
P.P.							X			X															X			X		X		
Number wrong	1	0	5	0	0	1	3	0	0	8	3	0	2	1	0	3	1	0	1	3	2	2	2	2	8	8	1	7	5	7	9	3
Percentage wrong	5	0	29	0	0	5	17	0	0	47	17	0	11	5	0	17	5	0	5	17	11	11	11	11	47	47	5	41	29	41	52	17

Names	Test VI											
	85	86	87	88	89	91	92	93	95	97	98	99
G.B.		X					X					
D.H.					X						X	
R.F.	X	X	X					X			X	
J.F.	X							X				
J.M.												
R.R.												
T.F.												
T.C.											X	
W.C.							X	X				
L.H.	X	X	X				X	X				
M.N.	X	X	X	X	X	X			X			
N.J.	X	X	X	X								
H.C.								X	X	X		
R.B.					X		X	X				
K.V.	X	X						X	X			
C.S.											X	
P.P.		X										
Number wrong	6	7	4	2	3	1	4	7	3	1	4	0
Percentage wrong	35	41	23	11	17	5	23	41	17	5	23	0

Table 5. The lower third of the forty-nine sophomores, showing what items were incorrect on the sight tests.

Names	Total scores	Test I						Test II													Test III					Test IV						
		1	2	3	6	7	9	13	14	16	18	21	24	25	26	28	30	31	32	34	36	39	40	42	43	46	48	50	51	52	63	55
D.D.	119											X	X		X							X		X								
W.C.	119					X									X							X		X								
R.Z.	118				X					X		X			X							X		X								X
O.F.	117				X					X														X								
W.Y.	116									X			X		X			X				X		X								
O.H.	116									X												X		X					X			
D.M.	114																															
C.H.	113											X	X				X	X						X						X	X	
W.D.	112												X											X		X						
J.M.	110																					X		X								
H.O.	110				X	X				X							X					X		X								
C.C.	106				X																	X		X								X
G.A.	105									X			X			X						X		X							X	X
J.F.	101				X					X		X	X	X	X	X		X				X		X							X	X
J.D.	101									X	X	X	X	X	X							X		X				X				X
J.L.	69				X	X				X		X	X	X		X		X				X	X	X								
Number wrong		0	0	0	6	3	0	0	0	9	1	6	6	3	6	3	2	4	0	0	0	12	1	15	0	1	0	1	1	1	3	5
Percentage wrong		0	0	0	37	18	0	0	0	56	6	37	50	18	37	18	12	25	0	0	0	75	6	93	0	6	0	6	6	6	18	31

Names	Test V																								
	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83
D.D.																		X							
W.C.	X			X						X					X			X	X				X	X	
R.Z.			X	X		X		X						X			X				X		X	X	
O.F.			X																X					X	
W.Y.																			X				X	X	
O.H.																		X	X		X			X	
D.M.			X															X							
C.H.			X	X		X											X				X			X	
W.D.																		X							
J.M.						X							X					X	X						
H.O.																			X			X			
C.C.													X					X	X		X	X	X		
G.A.				X		X			X		X	X				X	X	X	X		X			X	X
J.F.	X		X	X		X			X	X	X				X	X	X	X			X	X	X	X	
J.D.			X	X		X								X		X	X	X	X	X	X	X		X	X
J.L.	X		X	X	X	X	X		X		X	X	X	X		X	X	X	X	X	X	X		X	X
Number wrong	3	0	7	7	1	7	1	1	3	2	3	2	3	3	2	4	6	11	10	2	8	5	5	10	3
Percentage wrong	18	0	43	43	6	43	6	6	18	12	18	12	18	18	12	25	37	66	62	12	60	31	31	62	18

Names	Test VI															Test VII															
	85	86	87	68	89	91	92	93	95	97	98	99	102	103	105	107	106	109	110	111	112	113	114	115	116	117	118	119	120	121	122
D.D.	X	X		X							X				X						X						X			X	
W.C.	X	X	X					X												X				X			X	X			
R.Z.								X													X						X	X			
O.F.	X	X	X		X	X	X	X				X	X	X			X		X		X						X	X			X
W.Y.	X	X	X			X	X	X				X		X							X						X				
O.H.	X	X	X		X		X	X			X	X		X						X	X			X			X			X	
D.M.	X	X	X					X	X		X	X	X	X	X					X	X				X	X	X			X	
C.H.	X	X	X	X		X	X	X	X	X	X	X	X	X	X						X						X			X	
W.D.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X						X			X	
J.M.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X		X			X			X	X		X	
H.O.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						X				X		X			X	
C.C.	X				X	X	X	X	X	X	X	X	X	X	X						X						X	X	X	X	
G.A.	X	X	X						X	X			X							X				X			X	X		X	X
J.F.	X	X	X	X	X		X	X	X			X	X		X			X					X					X			
J.D.	X	X	X	X	X	X	X	X	X	X										X	X						X			X	
J.L.		X			X		X	X			X	X	X	X	X					X	X		X	X	X	X	X	X		X	
Number wrong	14	14	12	7	9	8	11	14	9	7	9	11	10	10	9	0	1	1	2	7	13	0	2	6	3	2	16	8	1	11	2
Percentage wrong	87	87	75	43	66	50	68	87	56	43	56	68	62	62	56	0	6	6	12	43	81	0	12	31	18	12	93	60	6	68	12

	Test VII																																																						Test VIII										
120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187
	X				X			X			X		X							X	X					X		X		X	X					X	X				X							X																		X	
									X				X	X	X			X				X				X		X																																				X	
									X		X					X					X		X			X		X			X						X														X					X	X									
		X							X		X	X		X	X	X					X					X		X			X										X			X														X		X							
					X				X		X			X	X			X			X		X			X		X	X			X				X	X				X																			X							X	
	X				X				X		X				X	X				X	X					X		X			X					X	X		X				X																							
	X		X					X	X				X		X		X	X			X					X	X	X			X		X				X											X																		
	X				X			X	X			X			X											X		X										X																												
	X				X				X		X		X	X	X		X			X	X	X				X		X			X						X			X	X																									
	X				X			X	X			X	X		X			X			X	X				X		X										X			X			X																						
	X		X		X			X	X		X		X		X					X						X		X	X		X							X			X								X								X									
X	X		X						X		X				X	X					X					X		X		X	X											X			X		X																			
	X	X			X				X	X		X	X		X	X		X		X	X	X				X	X	X								X		X																										X	
			X					X	X				X	X	X		X									X		X									X											X																		
	X		X		X			X	X				X		X			X			X	X				X		X	X	X								X			X	X																								
	X		X		X	X			X	X		X	X		X	X	X	X	X		X	X		X		X		X		X	X			X		X	X	X	X	X	X	X	X		X		X	X					X													X
1	11	2	6	0	10	1	0	7	15	2	8	5	10	5	14	6	4	7	1	5	12	6	2	1	0	16	2	16	3	4	9	1	1	1	0	5	8	6	2	2	8	3	2	2	2	0	2	4	1	0	1	0	1	0	0	1	3	0	2	0	0	0	0	0	4	1
6	68	12	37	0	62	6	0	43	93	12	50	31	62	31	87	37	25	43	6	31	75	37	12	6	0	100	12	100	18	25	56	6	6	6	0	31	50	37	12	12	50	18	12	12	12	0	12	25	6	0	6	0	6	0	0	6	18	0	12	0	0	0	0	0	25	6

Table 6. The upper third of the forty-nine seniors, showing what items were incorrect on the sight tests.

Names	Total scores	Test I						Test II													Test III					Test IV							Test V																										Test VI															Test VII																	
		1	2	3	5	7	9	13	14	16	18	21	24	25	26	28	30	31	32	34	36	39	40	42	43	46	48	50	51	52	53	55	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	85	86	87	88	89	91	92	93	95	97	98	99	102	103	105	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	1
C.M.	147																							X																											X																																	X						
D.D.	144									X																																									X								X																									X						
T.A.	144																							X											X																		X											X	X																										
G.R.	143																							X											X	X																	X											X	X																										
R.C.	142											X												X																																X								X	X																			X						
G.M.	142									X																																											X											X	X														X			X									
G.A.	141																					X		X											X																								X	X	X																									X						
B.S.	141											X										X		X												X																							X		X				X																X									
S.P.	140														X									X																											X			X						X					X																													
W.M.	140																					X		X											X																														X	X													X						X						
D.M.	140																																																							X	X																													X			X			
A.H.	140									X															X										X																														X	X			X			X							X						X			X			
H.S.	139														X							X		X																																					X			X	X																		X						
W.H.	139																					X			X											X																										X		X	X													X												
F.S.	138																					X		X				X																							X														X	X																			X						
N.H.	138													X								X		X											X	X										X																					X													X						X			X			
Number wrong		0	0	0	0	0	0	0	0	3	0	2	0	1	2	0	0	0	0	0	0	7	0	11	2	0	0	1	0	0	0	0	0	0	6	4	0	0	0	0	0	0	0	0	1	0	0	0	0	1	3	0	4	0	1	2	0	3	2	2	2	0	2	10	9	0	0	1	0	0	1	0	0	0	0	0	0	5	0	0	2	0	0	10	0	0	3	0	0	
Percentage wrong		0	0	0	0	0	0	0	0	18	0	12	0	6	12	0	0	0	0	0	0	43	0	68	12	0	0	6	0	0	0	0	0	0	37	25	0	0	0	0	0	0	0	0	6	0	0	0	0	6	18	0	25	0	6	12	0	18	12	12	12	0	12	62	56	0	0	6	0	0	6	0	0	0	0	0	0	31	0	0	12	0	0	62	0	0	18	0	0	

I	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	160	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	Test VIII 168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187
			X																							X																																									
						X	X						X													X																																								
							X																			X																					X																			
							X																			X																																							
			X																X										X																	X																			
						X							X			X				X																																												
											X		X	X												X																																							
						X							X	X												X																																							
							X					X	X			X									X																																							
			X			X	X																			X	X												X																										
						X	X				X		X											X	X	X																																						
			X																							X																																							
						X	X					X	X													X	X																																					
			X				X				X		X											X	X																																							
							X				X	X	X			X										X								X																														
			X			X	X																			X																																						
0	0	0	6	0	0	7	10	0	0	0	4	3	9	2	0	3	0	0	1	1	0	0	0	2	3	12	2	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
0	0	0	37	0	0	43	62	0	0	0	25	18	66	12	0	18	0	0	6	6	0	0	0	12	18	75	12	0	6	0	0	0	0	6	0	0	0	0	6	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0

Table 7. The middle third of the forty-nine seniors, showing what items were incorrect on the eight tests.

Names	Total scores	Test I						Test II													Test III					Test IV							Test V																									Test VI															Test VII																		
		1	2	3	6	7	9	13	14	16	18	21	24	25	26	28	30	31	32	34	36	39	40	42	43	46	48	50	61	52	53	55	59	60	61	62	63	84	65	66	67	88	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	85	86	87	88	89	91	92	93	95	97	98	99	102	103	105	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	126
C.J.	138									X									X			X			X										X	X															X													X																X			X						X				X
J.V.	137									X														X																											X													X	X												X							X							X
R.M.	137																					X																													X				X			X	X	X	X				X												X	X			X			X							
E.C.	137																					X		X																													X		X										X			X	X									X						X			X				X
R.M.	136									X											X	X		X	X			X											X																											X		X																	X							
W.D.	136									X						X						X		X				X								X												X							X	X								X	X	X																			X							
B.W.	135											X				X						X			X										X			X							X						X		X					X		X	X			X																			X									X
D.C.	135										X		X									X		X				X								X															X				X																												X			X							
C.S.	134				X																	X		X											X	X				X							X	X				X				X	X																														X							
D.R.	134				X										X							X		X									X																							X			X	X	X					X		X					X												X							
R.E.	134																			X		X																												X	X					X								X	X									X								X			X							
D.O.	133				X																			X																										X	X			X					X	X																							X			X					X		X
R.B.	132									X	X									X		X																						X						X	X						X	X	X	X					X															X						X	X		X				
L.G.	131									X		X										X		X				X																																	X		X		X	X	X					X														X						X
W.G.	131																					X		X				X								X	X													X																													X				X			X					X		
D.S.	130									X												X		X											X															X	X	X				X	X																		X				X						X					X		X
T.M.	129														X									X											X	X															X			X			X		X					X		X	X												X						X							
Number wrong		0	0	0	3	0	0	0	0	7	2	2	1	0	2	2	0	0	1	2	1	14	0	12	3	0	0	5	0	0	0	1	0	1	8	3	0	2	1	0	0	0	0	1	1	1	2	0	3	4	10	0	3	1	7	4	2	5	6	4	3	0	1	7	9	2	3	1	1	1	0	1	1	1	0	0	3	6	0	0	7	0	0	15	1	0	3	0	3	0	7
Percentage wrong		0	0	0	17	0	0	0	0	41	11	11	5	0	11	11	0	0	5	11	5	82	0	70	17	0	0	29	0	0	0	5	0	5	47	17	0	11	5	0	0	0	0	5	5	5	11	0	17	23	58	0	17	5	41	23	11	29	35	23	17	0	5	41	52	11	17	6	5	0	0	5	5	5	0	0	17	36	0	0	41	0	0	88	5	0	17	0	17	0	41

t VII 122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142
			X			X	X									X				
			X			X														
							X				X									X
			X			X														
							X						X							
							X						X							
			X				X						X							
							X						X							
							X					X	X							X
												X								
							X				X		X							
							X		X	X			X							X
	X		X							X	X		X							X
							X		X											
			X			X	X					X								
	X								X		X		X	X				X		X
	X		X	X	X	X							X	X						
							X					X	X						X	X
0	3	0	7	1	1	5	11	0	3	2	4	4	10	2	0	1	0	1	1	6
0	17	0	41	5	5	29	64	0	17	11	23	23	58	11	0	5	0	5	5	35

143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162
			X			X													
			X					X						X				X	
				X															
								X										X	
			X		X														
					X														
					X														
			X		X								X						
			X		X	X					X				X				
				X	X														
					X														
			X															X	
																		X	X
					X			X							X			X	
			X		X		X							X				X	
			X	X	X			X											
			X		X			X											
0	0	0	9	3	11	2	1	5	0	0	1	0	1	2	2	0	0	6	1
0	0	0	52	17	64	11	5	29	0	0	5	0	5	11	11	0	0	35	5

163	164	165	166	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187
															X								
													X										
														X				X					
													X										
0	0	0	0	0	2	1	0	0	0	0	0	0	2	1	1	0	0	1	0	0	0	0	0
0	0	0	0	0	11	5	0	0	0	0	0	0	11	5	5	0	0	5	0	0	0	0	0

Table 8. The lower third of the forty-nine seniors, showing what items were incorrect on the eight tests.

Names	Total score	Test I						Test II													Test III					Test IV							Test V																																												Test VII																
		1	2	3	5	7	9	13	14	16	18	21	24	25	26	28	30	31	32	34	36	39	40	42	43	46	48	50	51	52	53	55	59	60	51	62	63	64	65	56	57	68	59	70	71	72	73	74	75	76	77	78	79	80	81	82	83	85	85	87	88	89	91	92	93	95	97	98	99	102	103	105	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123
A.L.	127									X												X														X		X			X		X	X				X	X		X		X		X	X	X			X								X			X							X						X					
J.P.	127									X								X				X		X																						X				X	X					X			X					X	X			X			X							X									X		
E.W.	126								X	X		X			X			X				X		X				X															X				X						X						X		X			X	X																				X			X		
D.F.	125			X						X				X								X													X							X													X											X														X						X	X		X		X
L.V.	123																							X																						X																		X	X											X	X			X			X					
J.H.	123											X			X							X		X																					X					X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												X					
A.C.	122									X												X		X												X		X			X		X	X	X			X	X				X		X	X	X	X	X	X				X	X																				X					
P.M.	120									X												X		X																											X																											X				X		X	X		X		X
A.A.	120														X	X					X	X		X											X			X															X											X	X			X	X	X	X	X											X				X	
R.P.	119																					X		X				X				X			X										X								X			X		X	X	X		X		X	X												X				X			X	X		X		X
V.R.	118																					X		X											X												X			X					X			X	X					X	X			X										X						X					
A.S.	117																							X																					X					X	X		X									X						X			X						X	X			X			X			X		X
O.M.	116			X																		X		X			X								X																							X	X	X	X	X	X	X	X	X	X	X	X								X	X			X			X					X
N.C.	112									X		X		X										X												X		X			X		X	X	X			X	X				X			X	X	X	X	X	X	X			X	X	X	X	X								X	X						X			X	X	
W.B.	109									X	X	X	X		X							X		X												X		X			X					X			X		X		X		X	X							X	X			X	X		X							X			X			X	X	X			
G.H.	98								X			X	X					X				X		X																							X			X	X	X	X	X	X	X	X	X	X	X		X		X	X			X	X		X							X		X		X		X	X		X		X
Number wrong		0	0	2	0	0	0	0	2	8	1	5	2	2	4	1	0	3	0	0	1	13	0	14	0	0	1	2	0	0	0	1	0	0	5	4	0	5	0	0	4	1	4	3	5	3	3	3	4	5	7	1	9	2	6	7	4	7	9	7	4	5	2	11	13	3	3	10	6	2	7	2	0	0	0	0	5	11	0	1	5	2	0	15	5	1	8	2	5
Percentage wrong		0	0	12	0	0	0	0	12	50	6	31	12	12	25	6	0	18	0	0	5	81	0	87	0	0	6	12	0	0	0	5	0	0	31	25	0	31	0	0	25	5	25	18	31	18	18	18	25	31	43	6	55	12	37	43	25	43	56	43	25	37	12	68	81	18	18	52	37	12	43	12	0	0	0	0	31	58	0	6	31	12	0	93	31	6	50	12	37

Test VII

118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	136	136	137	138	139	140	141	142
X							X			X			X			X							X	
			X				X				X						X						X	X
X			X								X					X	X							
X	X		X		X		X		X	X	X			X	X								X	
X											X				X	X	X					X		X
X											X													
X										X	X				X	X	X							
X	X		X		X					X	X		X	X	X	X	X			X			X	X
X				X			X		X	X				X			X	X	X			X	X	X
X	X		X		X		X				X					X	X			X		X		X
X							X			X	X						X							
X			X		X		X			X	X		X	X	X	X	X			X				X
X					X						X		X		X	X	X							X
X			X	X			X				X				X		X							
X	X	X					X			X	X				X	X	X			X				X
X	X		X		X	X	X		X	X	X			X	X	X	X	X	X			X	X	X
16	5	1	8	2	6	1	10	0	3	9	14	0	4	6	9	10	13	2	2	4	0	4	8	9
93	31	6	60	12	37	6	62	0	18	66	87	0	25	31	66	62	81	12	12	26	0	26	37	56

143	144	145	146	147	148	149	150	151	152	153	154	155	156	167	168	169	160	161	162
					X														
			X	X	X													X	
			X		X										X			X	X
				X	X		X	X					X	X					
			X		X	X			X									X	
					X	X		X											
			X	X	X														
	X	X	X		X			X						X				X	X
				X		X		X					X		X		X		
			X		X			X									X	X	
			X	X	X	X													
			X		X			X							X			X	
					X			X							X				
			X		X			X							X		X	X	
	X				X			X							X		X	X	
			X		X		X	X					X	X				X	X
2	0	2	10	5	16	3	2	9	1	0	0	0	4	3	6	0	2	9	3
12	0	12	62	31	93	18	12	56	6	0	0	0	25	18	37	0	12	66	18

163	164	165	166
3	0	1	0
18	0	6	0

Test VIII

168	169	170	171	172	173	174	176	176	177	178	179	180	181	182	183	184	185	186	187
	X																		
X																			
	X																		
	X											X							
	X																		
									X	X								X	
	X																		
										X									
											X		X		X		X	X	X
	X					X													
	X								X										
1	7	0	0	0	0	1	0	0	2	2	1	1	1	1	1		1	2	1
6	43	0	0	0	0	6	0	0	12	12	6	6	6	6	6		6	12	6

The sophomore and senior results of the test.-- The following tables (Table 9 through Table 24) show the summary of numbers and percentages of pupils in the upper, middle, and lowest thirds of the sophomore and senior classes respectively who gave incorrect answers in each of the eight tests. Also, the writer has analyzed each test item in an attempt to show items no one missed, the items everyone missed, and those items which are more or less inconsistent with the total test.

Test I is a gymnasium-apparatus knowledge test with sketches depicting several types of apparatus commonly found in high school gymnasiums.

Table 9, Test I. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the sophomore class who scored incorrectly the items of Test I.

Test item	Sophomores					
	Upper third		Middle third		Lower third	
	Number	Percent	Number	Percent	Number	Percent
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
5	5	31	4	23	6	37
7	0	0	2	11	3	18
9	0	0	0	0	0	0

Items which no one missed: 1 (climbing rope), 2 (parallel bars), 3 (horse), and 9 (ladder).

Items which everyone missed: None.

Items which are more or less inconsistent with the total

test: 5, pertaining to the high bar.

The writer believes that no one missed items 1, 2, 3, and 9 because during the winter terms the climbing rope, parallel bars, horse, and ladder were in use a great deal. A great deal of inconsistency was shown by pupils answering item 5 because there was no high bar in the Natick high school gym and the only time the group had ever seen a high bar in use was in a teaching film, showing a gymnast performing on a high bar.

Table 10, Test I. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the senior class getting wrong the items of Test I.

Test item	Seniors					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	2	12
5	0	0	3	17	2	12
7	0	0	0	0	0	0
9	0	0	0	0	0	0

Items which no one missed: 1 (climbing rope), 2 (parallel bars), 7 (springboard), and 9 (ladder).

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 5, pertaining to the high bar.

It is believed that no one missed items 1, 2, 7, and 9 because this group had considerable work in the gymnasium on these four pieces of apparatus. Item 5 showed more or less inconsistency because of the same reason given for the sophomores in Table 9.

Test II is a gymnasium-equipment knowledge test with sketches of various type balls and other equipment used in high school gymnasiums.

Table 11, Test II. Summary of numbers and percentages of pupils in the upper, middle, and lowest thirds of the sophomore class getting wrong the items of Test II.

Test item	Sophomores					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
13	0	0	0	0	0	0
14	1	6	0	0	0	0
16	5	31	11	64	9	56
18	3	18	3	17	1	6
21	5	31	7	41	6	37
24	5	31	6	35	8	50
25	1	6	0	0	3	18
26	4	25	3	17	6	37
28	1	6	4	23	3	18
30	2	12	1	5	2	12
31	3	18	3	17	4	25
32	0	0	1	5	0	0
34	0	0	0	0	0	0

Items which no one missed: 13 and 34, pertaining to the football and high-jump standards.

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 14 (baseball), 16 (soccerball), 18 (basketball), 25 (badminton racquet), 26 (wand), 28 (dumbbell), 30 (jump rope), and 32 (gym mat).

The writer believes that no one missed items 13 and 34 because the sketches were clear and everyone was familiar with these two items.

Some inconsistency was shown in items 14, 16, 18, 25, 26, 28, 30, and 32 because the sketches on the test were not very clear; however, the writer has noticed that high school boys often confuse a volleyball with a soccerball.

Table 12, Test II. Summary of numbers and percentages of pupils in the upper, middle, and lowest thirds of the senior class getting wrong the items of Test II.

Test item	Seniors					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
13	0	0	0	0	0	0
14	0	0	0	0	2	12
16	3	18	7	41	8	50
18	0	0	2	11	1	6
21	2	12	2	11	5	31
24	0	0	1	5	2	12
25	1	6	1	5	3	18
26	2	12	2	11	6	37
28	0	0	2	11	1	6
30	0	0	0	0	0	0
31	0	0	0	0	3	18
32	0	0	1	5	0	0
34	0	0	2	11	0	0

Items which no one missed: 13 and 34, pertaining to the football and high-jump standards.

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 14 (baseball), 16 (soccerball), 18 (basketball), 25 (badminton racquet), 26 (wand), 28 (dumbbell), 30 (jump rope), and 32 (gym mat). These were the same items as listed in sophomore Table 11 and the same reason for inconsistency in the sophomore test is also apparent in this test for seniors.

Test III is a playing-fields knowledge test with sketches of five playing areas.

Table 13, Test III. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the sophomore class getting wrong the items of Test III.

Test item	Sophomores					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
36	0	0	0	0	1	6
39	11	68	14	82	13	81
40	1	6	0	0	0	0
42	14	87	13	76	14	87
43	1	6	2	11	1	6

Items which no one missed: None.

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 40 (football field), 42 (soccer field), and 43

(basketball court).

Although the sketches were not too clear or accurate, the writer doesn't understand why anyone should have missed numbers 40 and 42, the football field and basketball court. Number 43, the soccer field, was drawn with the official markings, and although soccer was taught at Natick High School, the field was never marked out with the official markings. This, I believe, accounts for the errors made on question number 43.

Table 14, Test III. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the senior class getting wrong the items of Test III.

Test item	Seniors					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
36	0	0	1	5	0	0
39	7	43	14	82	12	75
40	0	0	0	0	1	6
42	11	68	12	70	15	93
43	2	12	3	17	0	0

Items which no one missed: None.

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 36 (baseball diamond), 39 (volleyball court), and 43 (basketball court).

The writer doesn't see how anyone should have missed items 36 and 43, the baseball diamond and basketball court. Number 39, the volleyball court, was sketched with markings for a six-court game and although a great deal of volleyball was played at Natick High School, the court was never marked as presented in the sketch, thus accounting for the inconsistency of this test item.

Test IV is a calisthenics-knowledge test with stick figures executing various commands.

Table 15, Test IV. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the sophomore class getting wrong the items of Test IV.

Test item	Sophomores					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
46	0	0	1	5	0	0
48	1	6	0	0	1	6
50	2	12	5	29	2	12
51	0	0	0	0	0	0
52	0	0	0	0	0	0
53	0	0	1	5	0	0
55	2	12	3	17	1	6

Items which no one missed: 51 (command "at attention") and 52 (position for doing "sit-ups").

Items which everyone missed: None.

The following items show inconsistency with the total test: 46 ("chinning the bar"), 48 (position for doing

"push-ups"), 50 ("hands on hips, deep knee bend"), 53 ("lying on back, feet over-head and touching the floor"), and 55 ("hands over-head and feet apart--jump"). It is difficult to understand why anyone should have missed these commands as these exercises were used frequently and the stick figures were very clear.

Table 16, Test IV. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the senior class getting wrong the items of Test IV.

Test item	Seniors					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
46	0	0	0	0	1	6
48	0	0	0	0	0	0
50	1	6	5	29	1	6
51	0	0	0	0	1	6
52	0	0	0	0	1	6
53	0	0	0	0	3	18
55	0	0	1	5	5	13

Items which no one missed: 48, pertaining to the position for doing "push-ups."

Items which everyone missed: None.

Item 50 ("hands on hips, deep knee bend") was the only item which showed any inconsistency with the total test. There is no apparent reason for item 50 showing this inconsistency.

Test V is a gymnasium-skills knowledge test, listing terms used in wrestling, basketball, tumbling, boxing, calisthenics, and apparatus.

Table 17, Test V. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the sophomore class getting wrong the items of Test V.

Test item	Sophomores					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
59	2	12	0	0	3	18
60	0	0	0	0	0	0
61	2	12	8	47	7	43
62	3	18	3	17	7	43
63	0	0	0	0	1	6
64	2	12	2	11	7	43
65	0	0	1	5	1	6
66	1	6	0	0	1	6
67	1	6	3	17	3	18
68	0	0	1	5	2	12
69	0	0	0	0	3	18
70	0	0	1	5	2	12
71	3	18	3	17	3	18
72	1	6	2	11	3	18
73	2	12	2	11	2	12
74	0	0	2	11	4	25
75	0	0	2	11	6	37
76	3	18	8	47	11	68
77	4	25	8	47	10	62
78	0	0	1	5	2	12
79	3	18	7	41	8	50
80	1	6	5	29	5	31
81	3	18	7	41	5	31
82	6	37	9	52	10	62
83	0	0	3	17	3	18

Items which no one missed: 60 ("jab," a term used in boxing).

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 59 ("referee's hold up") and 66 ("pinned"), both terms used in wrestling. For no apparent reason these two items showed more or less inconsistency with the total test.

Table 18, Test V. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the senior class getting wrong the items of Test V.

Test item	Seniors					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
59	0	0	0	0	0	0
60	0	0	1	5	0	0
61	6	37	8	47	5	31
62	4	25	3	17	4	25
63	0	0	0	0	0	0
64	0	0	2	11	5	31
65	0	0	1	5	0	0
66	0	0	0	0	0	0
67	0	0	0	0	4	25
68	0	0	0	0	1	6
69	0	0	0	0	4	25
70	0	0	1	5	3	18
71	1	6	1	5	5	31
72	0	0	1	5	3	18
73	0	0	2	11	3	18
74	0	0	0	0	3	18
75	0	0	3	17	4	25
76	1	6	4	23	5	31
77	3	18	10	58	7	43
78	0	0	0	0	1	6
79	4	25	3	17	9	56
80	0	0	1	5	2	12
81	1	6	7	41	6	37
82	2	12	4	23	7	43
83	0	0	2	11	4	25

Items which no one missed: 59 ("referee's hold up"), 63 ("half nelson"), and 66 ("pinned").

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 60 ("jab"), 61 ("ring"), 77 ("45-second warning"), 79 ("elbow stand"), and 81 ("elbow block"). There is no apparent reason for these terms being inconsistent with the total test.

Test VI is a marching-knowledge test, listing marching commands and the correct execution of these commands.

Table 19, Test VI. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the sophomore class getting wrong the items of Test VI.

Test item	Sophomores					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
85	1	6	6	35	14	87
86	3	18	7	41	14	87
87	2	12	4	23	12	75
88	3	18	2	11	7	43
89	2	12	3	17	9	56
91	2	12	1	5	8	50
92	6	37	4	23	11	68
93	9	56	7	41	14	87
95	2	12	3	17	9	56
97	1	6	1	5	7	43
98	5	31	4	23	9	56
99	1	6	0	0	11	68
102	3	18	2	11	10	62
103	5	31	5	29	10	62
105	1	6	1	5	9	56

Items which no one missed: None.

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 88 ("counting off by fours"), 91 ("dress right"), 92 ("class--attention"), 93 ("front"), 98 ("right face"), 99 ("about face"), and 102 ("at ease"). The terminology and the sketches of stick figures executing marching commands was not too clear or accurate in this test and the writer believes this was the cause of the more or less inconsistency with the total test.

Table 20, Test VI. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the senior class getting wrong the items of Test VI.

Test item	Seniors					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
85	3	18	5	29	7	43
86	2	12	6	35	9	56
87	2	12	4	23	7	43
88	2	12	3	17	4	25
89	0	0	0	0	6	37
91	2	12	1	5	2	12
92	10	62	7	41	11	68
93	9	56	9	52	13	81
95	0	0	2	11	3	18
97	0	0	3	17	3	18
98	1	6	1	5	10	62
99	0	0	1	5	6	37
102	0	0	1	5	2	12
103	1	6	0	0	7	43
105	0	0	1	5	2	12

Items which no one missed: None.

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 91 ("dress right") and 92 ("class-attention"). The same reason for the more or less inconsistency with the total test as given for these two items in Table 19 for the sophomores would hold true in this case also.

Test VII is a game-knowledge test listing terms used in football, soccer, basketball, baseball, volleyball, and track.

Table 21, Test VII. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the sophomore class getting wrong the items of Test VII.

Test item	Sophomores					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
107	0	0	0	0	0	0
108	0	0	0	0	1	6
109	0	0	0	0	1	6
110	0	0	0	0	2	12
111	2	12	7	41	7	43
112	3	18	7	41	13	81
113	0	0	1	5	0	0
114	0	0	0	0	2	12
115	2	12	6	35	5	31
116	0	0	1	5	3	18
117	0	0	1	5	2	12
118	16	100	16	94	15	93
119	4	25	8	47	8	50
120	0	0	1	5	1	6
121	3	18	6	35	11	68
122	0	0	1	5	2	12

Table 21, Test VII. (continued)

Test item	Sophomores					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
123	4	25	3	17	6	37
124	0	0	0	0	0	0
125	4	25	11	64	10	62
126	0	0	0	0	1	6
127	0	0	1	5	0	0
128	0	0	3	17	7	43
129	10	62	14	82	15	93
130	0	0	0	0	2	12
131	0	0	4	23	8	50
132	0	0	2	11	5	31
133	3	18	7	41	10	62
134	1	6	5	29	5	31
135	12	75	12	70	14	87
136	4	25	7	41	6	37
137	0	0	1	5	4	25
138	2	12	4	23	7	43
139	1	6	0	0	1	6
140	1	6	6	35	5	31
141	3	18	10	58	12	75
142	1	6	5	29	6	37
143	0	0	0	0	2	12
144	0	0	0	0	1	6
145	0	0	0	0	0	0
146	4	25	12	70	16	100
147	2	12	2	11	2	12
148	15	93	15	88	16	100
149	1	6	0	0	3	18
150	0	0	0	0	4	25
151	3	18	5	29	9	56
152	0	0	1	5	1	6
153	0	0	0	0	1	6
154	0	0	0	0	1	6
155	0	0	1	5	0	0
156	0	0	5	29	5	31
157	0	0	2	11	8	50
158	3	18	4	23	6	37
159	0	0	0	0	2	12
160	0	0	2	11	2	12
161	2	12	6	35	8	50

Table 21, Test VII. (concluded)

Test item	Sophomores					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
162	0	0	0	0	3	18
163	0	0	1	5	2	12
164	0	0	1	5	2	12
165	0	0	0	0	2	12
166	0	0	1	5	0	0

Items which no one missed: 107 (bat), 124 (touchback), and 145 (tackle).

Items which everyone missed: None.

Items showing more or less inconsistency with the total test are as follows: 113 (quarterback), 118 (inside right), 123 (double), 136 (safety), 139 (nine innings), 149 (50-yard dash), 155 (touch-down), and 166 (shoulder block). Item 118, inside right, a position in soccer, was one of the questions missed by a number of pupils. The group was not familiar with the names of the positions in soccer. However, the writer can see no reason why the other items listed above would be answered in such a manner as to make them inconsistent with the total test.

Table 22, Test VII. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the senior class getting wrong the items of Test VII.

Test item	Seniors					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
107	0	0	1	5	0	0
108	0	0	1	5	0	0
109	0	0	0	0	0	0
110	0	0	0	0	0	0
111	0	0	3	17	5	31
112	5	31	6	35	11	68
113	0	0	0	0	0	0
114	0	0	0	0	1	6
115	2	12	7	41	5	31
116	0	0	0	0	2	12
117	0	0	0	0	0	0
118	10	62	15	88	15	93
119	0	0	1	5	5	31
120	0	0	0	0	1	6
121	3	18	3	7	8	50
122	0	0	0	0	2	12
123	0	0	3	17	6	37
124	0	0	0	0	1	6
125	6	37	7	41	10	62
126	0	0	1	5	0	0
127	0	0	1	5	3	18
128	7	43	5	29	9	56
129	10	62	11	64	14	87
130	0	0	0	0	0	0
131	0	0	3	17	4	25
132	0	0	2	11	5	31
133	4	25	4	23	9	56
134	3	18	4	23	10	62
135	9	56	10	58	13	81
136	2	12	2	11	2	12
137	0	0	0	0	2	12
138	3	18	1	5	4	25
139	0	0	0	0	0	0
140	0	0	1	5	4	25
141	1	6	1	5	6	37
142	1	6	6	35	9	56
143	0	0	0	0	2	12

Table 22, Test VII. (concluded)

Test item	Seniors					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
144	0	0	0	0	0	0
145	0	0	0	0	2	12
146	2	12	9	52	10	62
147	3	18	3	17	5	31
148	12	75	11	64	15	93
149	2	12	2	11	3	18
150	0	0	1	5	2	12
151	1	6	5	29	9	56
152	0	0	0	0	1	6
153	0	0	0	0	0	0
154	0	0	1	5	0	0
155	0	0	0	0	0	0
156	1	6	1	5	4	25
157	0	0	2	11	3	18
158	0	0	2	11	6	37
159	0	0	0	0	0	0
160	0	0	0	0	2	12
161	1	6	6	35	9	56
162	0	0	1	5	3	18
163	0	0	0	0	3	18
164	0	0	0	0	0	0
165	0	0	0	0	1	6
166	0	0	0	0	0	0

Items which no one missed: 109 (bunt), 110 (pole vault), 113 (quarterback), 117 (out), 130 (T-formation), 139 (nine innings), 144 (home-run), 153 (drop-kick), 155 (touch-down), 159 (base on balls), 164 (broad jump), and 166 (shoulder block).

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 115 (underhand serve), 121 (man-to-man), 126 (three

outs), 128 (pivot), 138 (serving area), and 154 (strike-out). The writer can see no apparent reason for this inconsistency.

Test VIII is a general-knowledge true-false test of statements pertaining to procedures in the running of the physical education program at Natick High School.

Table 23, Test VIII. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the sophomore class getting wrong the items of Test VIII.

Test item	Sophomores					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
168	0	0	0	0	2	12
169	2	12	3	17	4	25
170	1	6	1	5	1	6
171	1	6	0	0	0	0
172	0	0	1	5	1	6
173	0	0	0	0	0	0
174	0	0	0	0	1	6
175	0	0	0	0	0	0
176	0	0	1	5	0	0
177	0	0	3	17	1	6
178	2	12	0	0	3	18
179	0	0	0	0	0	0
180	1	6	0	0	2	12
181	2	12	2	11	0	0
182	2	12	0	0	0	0
183	0	0	0	0	0	0
184	0	0	1	5	0	0
185	0	0	0	0	0	0
186	1	6	2	11	4	25
187	0	0	0	0	1	6

Items which no one missed: 173, 175, 179, 183, and 185.

Items which everyone missed: None.

Items showing more or less inconsistency with the total test: 171, 176, 177, 178, 180, 181, 182, 184.

Table 24, Test VIII. Summary of numbers and percentages of pupils in the upper, middle, and lowest third of the senior class getting wrong the items of Test VIII.

Test item	Seniors					
	Upper third		Middle third		Lowest third	
	Number	Percent	Number	Percent	Number	Percent
168	0	0	0	0	1	6
169	3	18	2	11	7	43
170	0	0	1	5	0	0
171	0	0	0	0	0	0
172	0	0	0	0	0	0
173	0	0	0	0	0	0
174	0	0	0	0	1	6
175	0	0	0	0	0	0
176	0	0	0	0	0	0
177	0	0	2	11	2	12
178	2	12	1	5	2	12
179	0	0	1	5	1	6
180	0	0	0	0	1	6
181	0	0	0	0	1	6
182	0	0	1	5	1	6
183	0	0	0	0	1	6
184	0	0	0	0	1	6
185	0	0	0	0	1	6
186	0	0	0	0	2	12
187	0	0	0	0	1	6

Items which no one missed: 171, 172, 173, 175, and 176.

Items which everyone missed: None.

Items showing more or less inconsistency with the total

test: 169, 170, and 178.

Comparison of knowledge-test with athletic ability.--The writer has listed the ten boys receiving the highest scores in the sophomore and senior class respectively, and also the ten boys receiving the lowest scores in the sophomore and senior class in an attempt to see if there is any comparison between the scores made on this test and the athletic ability of the boys making these scores.[1]

The writer also feels that the only way to judge the athletic ability of the group in this particular case is by whether or not the boy has been on any athletic squad. As there was no test given to measure athletic ability, the following classification was used:

Very little athletic ability--the boy has not been on any athletic squad.

On athletic squad--the boy has been on a major sports squad (football, hockey, basketball, or baseball).

On athletic team--the boy has been on the first team and has been awarded a varsity letter in that sport (football, hockey, basketball, or baseball).

Table 25 lists the ten boys in the sophomore class receiving the highest scores and their athletic ability.

1/It must be understood that at the time this test was given the sophomores had only been in high school for a half year and therefore were only eligible to go out for the fall and winter sports teams, namely football, hockey, and basketball.

Table 25. Comparison of the scores made by the ten highest boys in the sophomore class with their athletic ability.

Names	Knowledge-test scores	Athletic ability
R.H.	142	Very little athletic ability
G.T.	140	Very little athletic ability
C.H.	140	Very little athletic ability
C.A.	140	Very little athletic ability
A.W.	136	Very little athletic ability
C.B.	136	On athletic squad
C.S.	135	Very little athletic ability
D.M.	135	Very little athletic ability
R.K.	134	Very little athletic ability
J.W.	134	Very little athletic ability

Table 26 lists the ten boys in the sophomore class receiving the lowest scores and their athletic ability.

Table 26. Comparison of the scores made by the ten lowest boys in the sophomore class with their athletic ability.

Names	Knowledge-test scores	Athletic ability
D.M.	114	Very little athletic ability
C.H.	113	On athletic squad
W.D.	112	Very little athletic ability
J.M.	110	Very little athletic ability
H.G.	110	On athletic squad
C.C.	106	Very little athletic ability
G.A.	105	Very little athletic ability
J.F.	101	On athletic team
J.D.	101	On athletic squad
J.L.	69	Very little athletic ability

Table 27 lists the ten boys in the senior class receiving the highest scores and their athletic ability.

Table 27. Comparison of the scores made by the ten highest boys in the senior class with their athletic ability.

Names	Knowledge-test scores	Athletic ability
C.M.	147	Very little athletic ability
D.D.	144	Very little athletic ability
T.A.	144	On athletic team
G.R.	143	Very little athletic ability
R.C.	142	On athletic team
G.M.	142	Very little athletic ability
G.A.	141	On athletic team
B.S.	141	Very little athletic ability
S.P.	140	On athletic team
W.M.	140	On athletic team

Table 28 lists the ten boys in the senior class receiving the lowest scores and their athletic ability.

Table 28. Comparison of the scores made by the ten lowest boys in the senior class with their athletic ability.

Names	Knowledge-test scores	Athletic ability
A.C.	122	On athletic team
P.M.	120	Very little athletic ability
A.A.	120	Very little athletic ability
R.P.	119	On athletic squad
V.R.	118	Very little athletic ability
A.S.	117	On athletic team
G.M.	116	On athletic team
N.C.*	112	Very little athletic ability
W.B.	109	Very little athletic ability
G.H.**	98	Very little athletic ability

* Was required to take a restricted physical-education program because of deafness.

** Was excused from all physical-education work because of a heart condition.

In analyzing Tables 25 and 26 we notice that of the ten boys in the sophomore class making the highest scores on the knowledge-test, only one was on an athletic squad, while in the sophomore group making the ten lowest scores on the knowledge-test, three were on athletic squads and one was on an athletic team.

In like manner, Tables 27 and 28 show that of the ten boys in the senior class making the highest scores on the knowledge-test, five were on athletic teams while in the senior group making the ten lowest scores on the knowledge-test, three boys were on athletic teams and one was on an athletic squad.

The summary above suggests that there is little or no association in the sophomore class between those receiving the highest scores in the knowledge-test and athletic ability. In the senior class there seems to be a slight comparison between the knowledge-test scores and the athletic ability of the ones making these scores, with the boys having the highest knowledge-test scores having the greatest athletic ability.

CHAPTER III

CONCLUSIONS

After constructing, administering, scoring, and evaluating this test the writer has listed the following conclusions:

1. The test has served the purpose for which it was constructed. It has (a) tested the sophomores and seniors in their knowledge of terms and phrases used in the physical-education program at Natick High School and (b) through this test the writer was able to determine whether superior knowledge of these terms is associated with superior abilities for things physical.

2. The results obtained have suggested that the seniors have received higher scores than the sophomores.

3. There is little or no relationship between this knowledge-test and the athletic ability of the sophomores, while there seems to be a slight relationship between this knowledge-test and the athletic ability of the seniors.

4. The writer feels that there is a definite need for the teaching of terms and phrases in connection with physical education and athletics and a test of this type could be used for the purpose of testing this knowledge.

5. A test of this type might be given to all those taking physical education in a school and the scores added to a permanent record along with the health examination, strength test, and a motor-ability test. This would give a better "over-all" picture of the pupil's ability and knowledge in physical education.

6. A test of this kind might be used to see if there is any correlation between a knowledge-test and (a) a strength-test (P.F.I.), (b) a health examination, (c) a motor-ability test, and (d) an intelligence test.

7. The writer feels that if he were to construct another knowledge-test in physical education he would have an equal number of test items in each division of the test (warm-up, games, skills, gym apparatus, playing areas, sports and gym equipment, and general knowledge). In this way one would not be putting undue emphasis on any one division as was so evident in this test in which there were seven test items listed under "warm-up" and one hundred test items under "games and skills." All drawings and sketches would be enlarged and improved upon. This would help to eliminate many of the errors due to the poor sketches.

APPENDIX

A Knowledge Test in Physical Education

by

William E. Connors
Natick High School

This is a test in physical education to test the pupil's knowledge of terms used in the various branches of physical education. Follow directions carefully.

Pupil's name_____

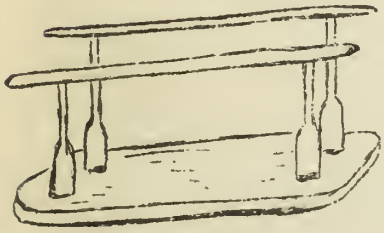
Class (Soph-Jr. or Sr.)_____

Date_____

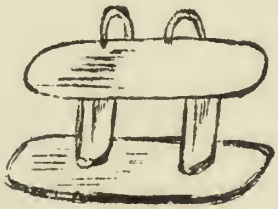
Score (Do not fill in)_____

I Gymnasium Apparatus Knowledge Test.

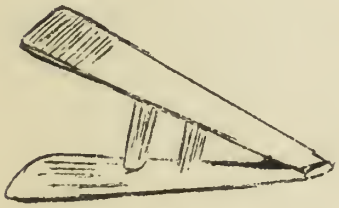
Directions:
In the gymnasium we see the apparatus pictured below. Show that you know what each piece of apparatus is called. Do this by putting on the correct blank lines at the right of the page, the letters which now appear only under the pictures. For example, put letter F on blank line number 8.



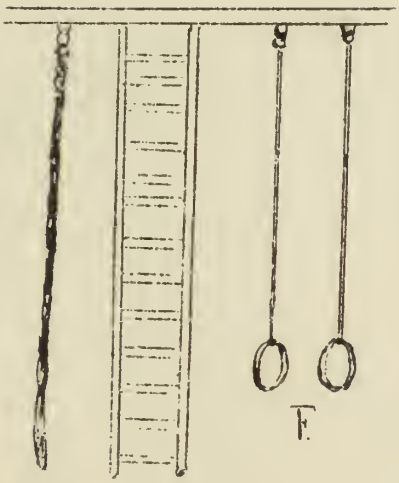
A.



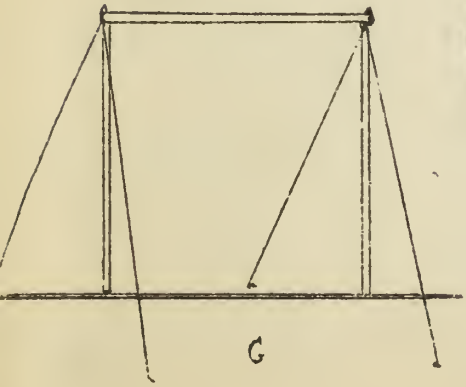
B.



C.



D E F



G

1.___Climbing rope

2.___Parallel bars

3.___Horse

4.___Boom

5.___High bar

6.___Stall bar

7.___Springboard

8. F Rings

9.___Ladder

10.___Buck

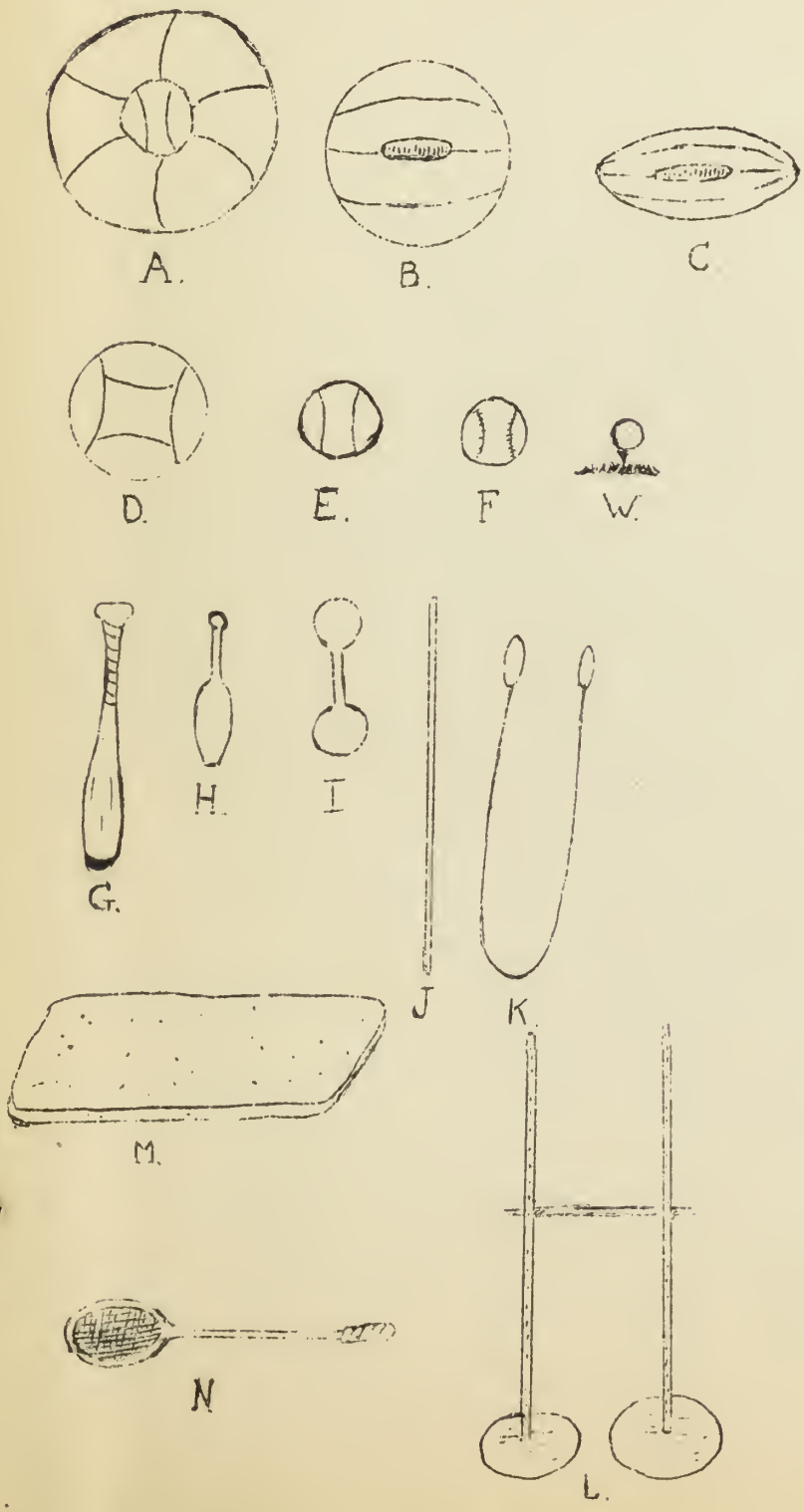
11.___High jump standards

12.___Traveling rings

Score _____
(Number right)

II Gymnasium Equipment Knowledge Test.

Directions:
In the same way as you did in number I, show that you know the following items of gymnasium equipment. For example, put W on line 23.



13.___Football

14.___Baseball

15.___Ping-pong ball

16.___Soccerball

17.___Handball

18.___Basketball

19.___Tether-ball

20.___Softball

21.___Medicine ball

22.___Tennis ball

23. W Golfball

24.___Indian club

25.___Badminton racquet

26.___Wand

27.___Boxing glove

28.___Dumbbell

29.___Whistle

30.___Jump rope

31.___Softball bat

32.___Gym mat

33.___Boxing headgear

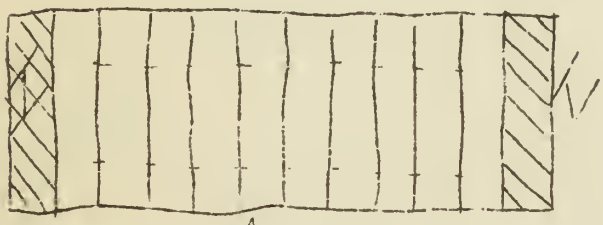
34.___High jump standards

Score _____
(Number right)

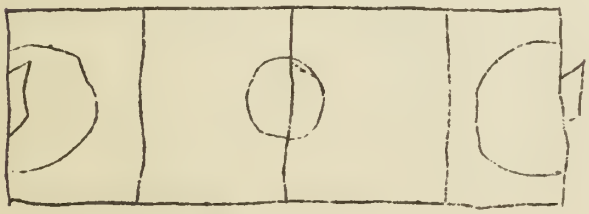
III Playing fields Knowledge Test

Directions:
Below are diagrams of five playing fields. Also there are listed several sports to choose from. As you did in part I and II place beside the list of fields the letter that best discribes that field.

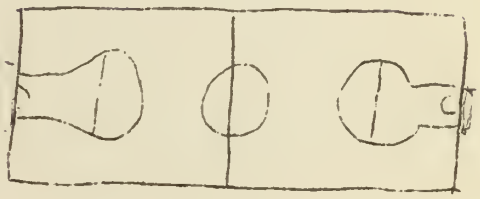
35.___Golf
36.___Baseball
37.___Tennis
38.___Archery
39.___Volleyball
40.___Fotball
41.___Ice Hockey
42.___Soccer
43.___Basketball
44.___Badminton



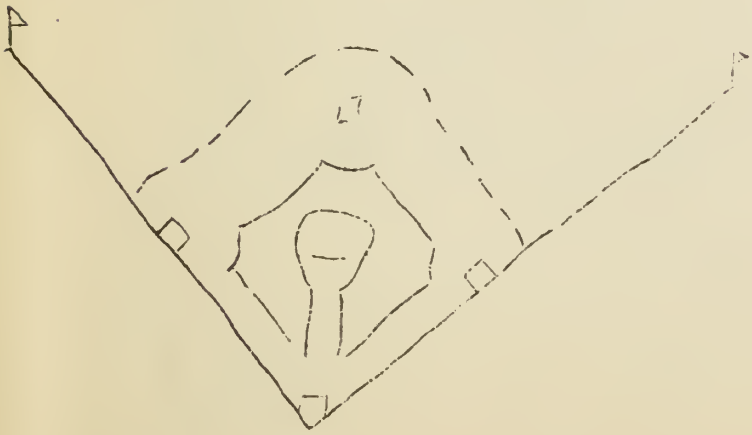
A.



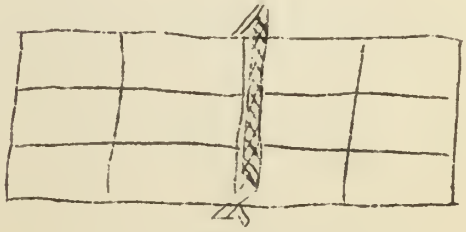
B.



D.



C.



E.

Score _____
(Number right)

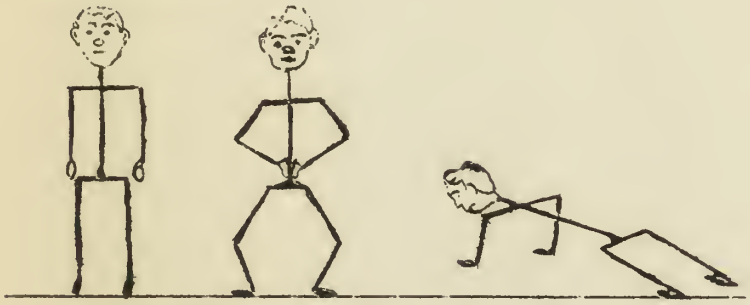
IV Calisthenics Knowledge Test.

Directions:
Place the letters under the pictures on the correct blank lines at the right. Example--The letter X would be placed in the blank beside number 45, Headstand.

Example:

X

EXERCISES:



A. B. C.

D. E

F

G.

45. X Headstand

46. ___ Chinning the bar

47. ___ Running in place

48. ___ Position for doing "push-ups"

49. ___ Hands on hips, trunk forward bend.

50. ___ Hands on hips, deep knee bend.

51. ___ At "attention"

52. ___ Position for doing "sit-ups"

53. ___ Lying on back, feet over-head and touch floor.

54. ___ Swing arms forward and jump up.

55. ___ Hands overhead, and feet apart--jump.

56. ___ Hands overhead, trunk forward downward bend.

57. ___ Stand erect, arms in running position.

Score _____
(Number right)

V Gymnasium Skills knowledge Test

Directions:
Below is a list of terms. In what gymnasium skills are they found? Place in front of the terms the letters W, BK, T, B, A, or C, to show that you know.

Gymnasium skills:

W--Wrestling	T--Tumbling	A--Apparatus
BK--Basketball	B--Boxing	C--Calisthenics

Example:
Place a T in the blank space because that is a Tumbling skill.

58. T Frog stand balance.

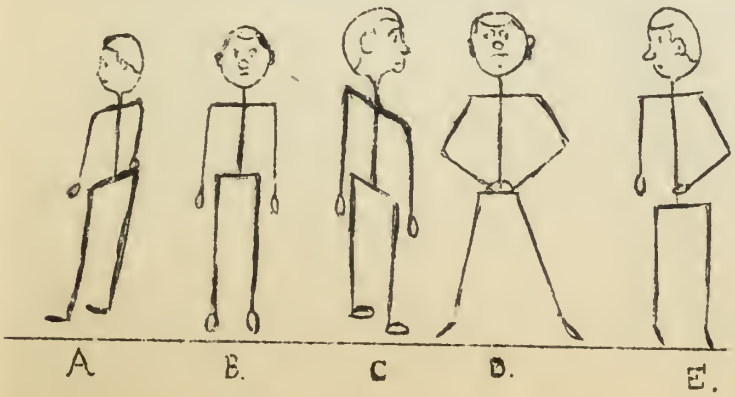
59. ___ Referee's hold up.
60. ___ Jab
61. ___ Ring
62. ___ Headstand
63. ___ Half nelson
64. ___ Hand spring
65. ___ Left-jab
66. ___ Pinned
67. ___ Cartwheel
68. ___ Referee's hold down
69. ___ Back flip
70. ___ Forward roll
71. ___ Breakdown
72. ___ Round
73. ___ Weaving
74. ___ Front flip
75. ___ Hand stand
76. ___ Fall
77. ___ 45 second warning
78. ___ Scissors hold
79. ___ Elbow stand
80. ___ Time advantage
81. ___ Elbow block
82. ___ Forward shuffle
83. ___ Backward roll

Score _____
(Number right)

Marching is used in physical education to teach the individual to follow a command and to move a group about the floor with ease and speed. The following test is to see if you know some of the fundamental commands used in marching. Place the letter in front of the Command in the blank space beside the correct Execution of that command.

Example	Command	Execution
A.	"One step forward--March"	84. A March one step forward
B.	"At ease"	85. ___ A $\frac{1}{4}$ turn right
C.	"Count off by fours"	86. ___ A $\frac{1}{2}$ turn right
D.	"Forward march"	87. ___ A $\frac{1}{4}$ turn left
E.	"Front"	88. ___ 1-2-3-4; 1-2-3-4; ect.
F.	"Dress right"	89. ___ Number one boy steps in front of number two boy.
G.	"About face"	90. ___ March four paces forward, and then right face.
H.	"Left face"	91. ___ Left hand on hip, look to right.
I.	"Form Two's in front of right"	92. ___ Standing at "attention" facing front.
J.	"Right face"	93. ___ Head up, facing front, arms to sides.
K.	"Class--Attention"	94. ___ Four paces to the rear, March.
		95. ___ Hands behind back, grasp thumb, one foot to the side.
		96. ___ Running in place
		97. ___ Step off with the left foot,-"march"

The stick figures below are executing marching commands. Place in the space opposite the description at the right the letter under the stick figure which best illustrates the command.



98. ___ Right face
99. ___ Dress right
100. ___ Deep knee bend
101. ___ Marching by two's
102. ___ At ease
103. ___ Left face
104. ___ About face
105. ___ Front, and "at attention"
106. ___ Break ranks

Score _____
(Number right)

VII Game Knowledge Test.

Directions:
Below is a list of terms. In what sports are they found? Place in front of the term the abbreviation F, S, BK, BB, V or T to show that you know.

Sports: F--Football BK--Basketball V--Volleyball
S--Soccer BB--Baseball T--Track

Example: Place BB in the blank space beside number 107--Bat.

Terms	Terms
107.____Bat	137.____Fly
108.____Forward pass	138.____Serving area
109.____Bunt	139.____Nine innings
110.____Pole vault	140.____Technical foul
111.____Goalie	141.____Flanker
112.____Zone defense	142.____Overhand serve
113.____Quarterback	143.____Off-tackle play
114.____Punt	144.____Home run
115.____Underhand serve	145.____Tackle
116.____Hit	146.____Penalty kick
117.____Out	147.____Center pass
118.____Inside right	148.____Set-up
119.____Clipping	149.____50-yard dash
120.____Lateral pass	150.____Triple
121.____Man-to-man	151.____Lay-up shot
122.____High jump	152.____100 yard dash
123.____Double	153.____Drop-kick
124.____Touchback	154.____Strike-out
125.____Chest pass	155.____Touch-down
126.____Three outs	156.____6-3-2- defense
127.____Right end	157.____Center jump
128.____Pivot	158.____Field goal
129.____Heading the ball.	159.____Base on balls
130.____T-formation	160.____Linesman
131.____Personal foul	161.____Bounce pass
132.____"Texas leaguer"	162.____Ball four
133.____Rotate	163.____Sacrifice hit
134.____Free throw	164.____Broard jump
135.____Trapping the ball	165.____Single
136.____Safety	166.____Shoulder block

Score _____
(Number right)

VIII General Knowledge Test

Directions:
Below are several statements. If you think they are true circle the T. If you think the statement is false, put a circle around the F.

Example 167. (T) F Physical education classes are held both out of doors and in the gymnasium.
This statement is true so you would circle the T.

168. T F Physical education will tend to improve the general physical condition of the individual.
169. T F When the instructor blows his whistle in the gym. you whould stand where you are with no talking.
170. T F A hot and cold shower should follow a good "Work-out" in the gym.
171. T F A class leader is always picked from the biggest and toughest boy in the class.
172. T F Good Sportsmanship can be developed on the gym floor.
173. T F Speed in getting into gym suits at the beginning of the period gives you more time on the floor for a game.
174. T F In doing exercises, you only get out of it what you put into it.
175. T F You can buy a good muscular build at any Hardware store.
176. T F Good posture improves one's appearance.
177. T F A good leader is an intelligent follower.
178. T F Athlete's foot is a contagious desease.
179. T F Athlete's foot can be "Picked up" around locker and shower rooms if one doesn't use precautions.
180. T F Jumping rope is a "sissy's" game even though professional boxers jump rope.
181. T F Marching tends to give one a sense of rhythm.
182. T F You should walk throught the foot-bath solution after taking a shower to help prevent athlet's foot.
183. T F You should wear street shoes on the gym floor instead of sneakers.
184. T F By following directions well in the gym class you will be looked upon as one who could handle greater responsibilities.
185. T F Cuts and bruises should be ignored and not treated.
186. T F Good health is an asset to everyone.
187. T F Push-ups and sit-ups are given to the men in the armed services to develop their physical strength.

Score _____
(Number right)

Classification and Tabulation of Sophomore Test Scores

	f	d	fd	fd^2
141-142	1	+5	+5	25
138-140	3	+4	+12	48
135-137	4	+3	+12	36
132-134	4	+2	+8	16
129-131	8	+1	+8	8
126-128	5	0	(+45)	
123-125	4	-1	-4	4
120-122	1	-2	-2	4
117-119	7	-3	-21	63
114-116	3	-4	-12	48
111-113	2	-5	-10	50
108-110	2	-6	-12	72
105-107	2	-7	-14	98
102-104	2	-8	-16	128
99-101	0	-9	0	0
96-98	0	-10	0	0
93-95	0	-11	0	0
90-92	0	-12	0	0
87-89	0	-13	0	0
84-86	0	-14	0	0
81-83	0	-15	0	0
78-80	0	-16	0	0
75-77	0	-17	0	0
72-74	0	-18	0	0
69-71	1	-19	-19	361
N--49			(-110)	961

1. Assumed mean (127)

$\Sigma fd = +45 + (-110) = -65$

$\frac{\Sigma fd}{N} = \frac{-65}{49} = -1.33 = c$

$c = 3 \times 1.33 = -3.99$

$127 + (-3.99) = 123.01$ (M)

2. Arithmetic Mean (M) = 123.01

3. Median = 125.60

$\frac{N}{2} = \frac{49}{2} = 24.5$

$24.5 - 24 = .5$

$\frac{.5}{5} = .100 \qquad .100 \times 3 = .300$

Real limits = 125.5 - 128.5

$125.5 + .100 = 125.60$

4. Standard deviation: = 7.3

$$S.D. \sqrt{\frac{\text{sum of } fd^2}{N} - \left(\frac{\text{sum of } fd}{N}\right)^2} \times \text{size of class interval}$$

$$S.D. \sqrt{\frac{961}{49} - \left(\frac{-65}{49}\right)^2} \times 3$$

$19.61 - 1.69 = 17.92$

$\times\ 3$

53.94

$$S.D. \sqrt{53.94}$$

$$S.D. = 7.3$$

Classification and Tabulation of Senior Test Scores

	f	d	fd	fd^2
145-147	1	+4	+4	16
142-144	5	+3	+15	45
140-141	6	+2	+12	24
137-139	8	+1	+8	8
134-136	7	0	(+39)	0
131-133	4	-1	-4	4
128-130	2	-2	-4	8
125-127	4	-3	-12	36
122-124	3	-4	-12	48
119-121	3	-5	-15	75
116-118	3	-6	-18	108
113-115	0	-7	0	0
110-112	1	-8	-8	64
107-109	1	-9	-9	81
104-106	0	-10	0	0
101-103	0	-11	0	0
98-100	0	-13	-12	144
N--49			(-94)	661
		dif.	(-55)	

1. Assumed mean (135)

$\Sigma fd = +35 + (-94) = -55$

$\Sigma \frac{fd}{N} = \frac{-55}{49} = 1.12 = c$

$c = 3 \times -1.12 = 3.36$

$135 + (-3.36) = 131.6$

2. Mean = 131.6

3. Median = 133.71

$\frac{N}{2} = \frac{49}{2} = 24.5$

$24.5 - 24 = .5$

$\frac{.5}{7} = .071 \quad .071 \times 3 = .213$

Real limits = 133.5 - 136.5

$133.5 + .213 = 133.713$

4. Standard deviation: = 6.05

$$S.D. \sqrt{\frac{\text{sum of } fd^2}{N} - \left(\frac{\text{sum of } fd}{N}\right)^2 \times \text{size of class interval}}$$

$$S.D. \sqrt{\frac{661}{49} - \left(\frac{-55}{49}\right)^2 \times 3}$$

$$S.D. \sqrt{36.72}$$

$$S.D. = 6.05$$

Date Due

MAY 8	1950	APR 27 1955	
		MAY 4 1955	
MAY 18 1950		JAN 23 1956	
JUL 6	1950	NOV 26 1957	
OCT 6	1950	FEB 17 1958	
OCT 18 1950		MAY 28 1958	
		JUN 9 P.M.	
JUL 21 1952		JUN 30 1958	
OCT 23 1952		AUG 7 1958	
JAN 14 1953			
FEB 5	1953		
JUL 30 1953			
NOV 16 1953			
MAY 17 1954			
OCT 21 1954			
FEB 23			
MAR 2	1955		

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